An Ecosystem Approach To Estuarine Science:

A Perspective From The
US Commission on Ocean Policy

Paul A. Sandifer
Commissioner

The Stratton Commission

"Our Nation and the Sea"
1969

Oceans Act of 2000 – Purpose

To establish a Commission to make recommendations for a coordinated and comprehensive ocean policy that will promote:

- Protection of life & property
- Stewardship of ocean & coastal resources
- Protection of marine environment & prevention of marine pollution
- Enhancement of maritime commerce
- Expansion of human knowledge of the marine environment
- Investment in technologies to promote energy & food security
- Close cooperation among government agencies
- US leadership in ocean and coastal activities

Oceans Act of 2000

What is the job of the Commission?

- **The Commission** is to give equal consideration to environmental, technical feasibility, economic, and scientific factors. In addition, the recommendations may not be specific to the lands or waters within a single state.

Members US Commission On Ocean Policy

U.S. COMMISSION ON OCEAN POLICY

- **Milestones as of July 2003**
  - **Held 15 public meetings, including 9 regional meetings**
  - **Conducted 17 site visits around the nation**
  - **Heard from 440 presenters - invited and public**
  - **Made transition to deliberative stage in November 2002**

Observations, Challenges, Opportunities

- **Our nation's capability to manage our coasts is clearly inadequate.**
- **Depletion of fish stocks continue.**
- **Ocean pollution is a growing problem.**
- **Water-borne commerce is essential to the Nation's economic well-being.**
- **Oceans and climate are inextricably linked but not nearly well enough understood.**

Observations, Challenges, Opportunities

- **Abrupt climate change could profoundly alter the landscape of our country in perhaps a decade or less.**
- **The Arctic Ocean is one of the least understood of all the world's oceans.**
- **Particularly important features – such as coral reefs, unique coastal and estuarine habitats, areas of high biodiversity – may require special protection.**

Observations, Challenges, Opportunities

- **Jurisdictional and legal confusion and ambiguity are huge problems.**
- **The lives of all Americans – landlocked as well as coastal– are inextricably affected by the ocean. And all Americans affect the ocean, wherever they live.**

Topics Considered by USCOP

- Aquaculture
- Biodiversity
- Coastal Management
- Coral Resources
- Data Management
- Dredging/Sediments
- Ecosystem-Based Management
- Education
- Enforcement
- Exploration
- Federal Agency Reorganization
- Fisheries
- Governance
- Habitat
- Infrastructure

USCOP Topics Continued

- Integrated Observing System
- International Leadership
- Invasive Species
- Investment
- Marine Mammals
- Marine Protected Areas
- Monitoring
- Oceans & Human Health
- Offshore Uses & Opportunities
- Policy Framework
- Pollution
- Research
- Technology
- Watersheds

US COMMISSION ON OCEAN POLICY: Website

www.oceancommission.gov

USCOP GUIDING PRINCIPLES RELATED TO SCIENCE

- Decision-making processes should be based on an understanding of natural and social processes and influences.
- To the extent possible, marine resource management should be ecosystems-based.
- A precautionary approach should be used in developing and implementing management plans.

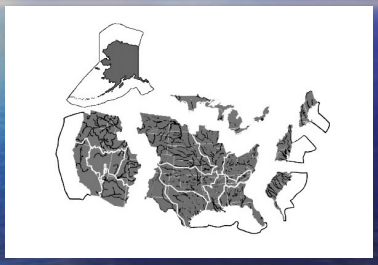
Ecosystem-Based Management

- The USCOP's proposed definition of "ecosystem-based management" is: "managing human activities and potential impacts on species or resources within the context of their interactions with other species and the physical environment. The management framework should be multi-species and cross physical boundaries."

Ecosystem-Based Management

- The nation's marine policy-making processes should include a regional ecosystem framework.
  - Delineated on the ocean sides by the boundaries of the current Regional Fishery Management Councils
  - Delineated on the land side by boundaries of the large watersheds that drain into the marine waters under the jurisdiction of each RFMC
  - A new Great Lakes eco-region would be created

Possible Eco-Region Boundaries



USCOP Policy Option: Proposed Definition of Precautionary Approach

- **The Precautionary Approach is applying judicious and responsible management practices, based on best available science, proactively rather than reactively, to ensure the sustainability of ecosystems for the benefit of future as well as current generations. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing action to prevent environmental degradation. Scientific assessment, monitoring, the potential for mitigation to reduce environmental risk, and appropriate periodic review of the precautionary restrictions should be part of the management plan.**

Status of Ocean Science Funding

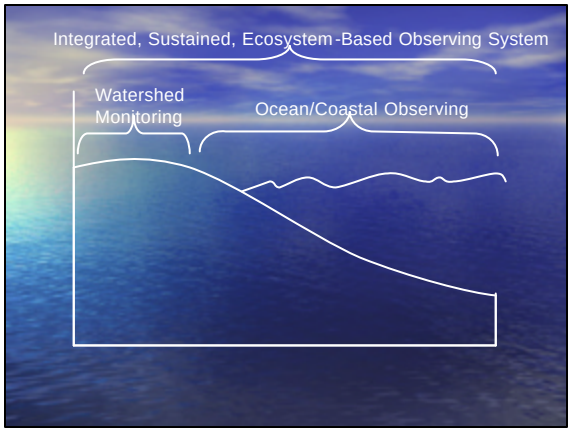
- Thirty of 50 US states have ocean or Great Lake coastlines
- ~50% or more of the US population lives within the coastal zone
- One of every 6 US jobs is marine-related
- Yet, only ~3.5% of the Federal budget for basic research is spent on ocean sciences, down from 7% 20+ years ago.

USCOP Policy Options Under Consideration: Research Funding

- The Administration should propose, at a minimum, a doubling of the Federal ocean research budget from today's $630M to $1.3B.
- Federal funding for technology should be on a par with the requested increase for ocean research to ensure the Nation has the requisite tools – including the Integrated Coastal and Ocean Observing and Prediction Systems -- to conduct a rigorous program of ocean science.

USCOP Policy Option Under Consideration: Integrated Ocean Observing System

- Must be a "whole-earth" system; need to understand ocean-atmosphere-land couplings (e.g., watersheds to ocean)



USCOP Policy Option Under Consideration: Integrated Ocean Observing System

- Must have strong biological components, such as
  1. Methods to examine marine biodiversity at various scales
  2. Measurements of human and environmental health parameters
  3. Observations of fishery and protected species populations

USCOP Policy Option Under Consideration: Integrated Ocean Observing System

- Must incorporate satellite observations

USCOP Policy Option Under Consideration: Integrated Ocean Observing System

- Must be integrated & coordinated across agencies, country and, to degree possible, internationally
- NOAA could be the lead agency for IOOS and leverage off Navy's ocean data capabilities and infrastructure
- Other NOPP agencies, especially NSF and NASA, must be integrally involved

USCOP Policy Option: Ocean & Coastal Observing & Prediction Systems

- Must have sustained, long-term support
- Must address needs of multi-sector users: marine operations, research, education, monitoring
- Should be implemented with a clear plan for transitioning research and development to operations

USCOP Policy Option: Biodiversity

- The US Government should develop a comprehensive program to study marine biodiversity at genetic, species and ecosystem scales
- Beyond mere enumeration, the program should explore the range of causes for declining biodiversity and potential solutions
- Conservation of biodiversity should be a specific consideration of any ecosystem-based management regime

USCOP Policy Option: Oceans & Human Health

Federal government should establish an aggressive, fully-funded and coordinated Oceans and Human Health Program that fosters and supports academic-private-sector-government partnerships to:

- Conduct research that leads to understanding of the complex inter-relations, pathways and causal effects of marine pollution, harmful algal blooms, ecosystem degradation and alteration, and human health
- Monitor and assess pollution inputs, ecosystem health and human health impacts

USCOP Policy Options Under Consideration: Oceans & Health

- Develop new technologies for measuring human and environmental/ecological health parameters in the marine environment
- Develop models for predicting and mitigating pollution, harmful algal blooms, and diseases that may affect humans as well as marine organisms
- Establish a marine biotechnology R&D program that fosters private sector investment and sets a clear policy governing biotech activities

USCOP Policy Option: Marine Protected Area Definition

- A Marine Protected Area (MPA) is a specified area of the marine environment that has been set aside for the purpose of conservation of natural or cultural resources.

USCOP Policy Option: Marine Protected Areas

- Congress should establish national standards for MPA development
- National standards should guide national, regional, and local efforts to develop MPAs
- Any national initiative to create an MPA should involve substantial regional and local coordination and participation
- MPA management plans should include scientific or cultural assessment, monitoring plan, and periodic review

Challenge For Ecosystem-Based Estuarine Research

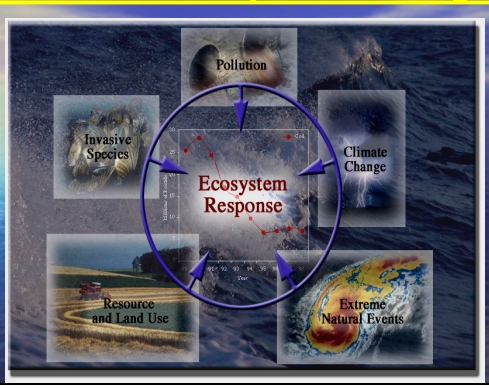
"We are confronted with insurmountable opportunities." POGO

And one of those seemingly insurmountable opportunities is ecosystem-focused research

Drivers of Ecosystem Change

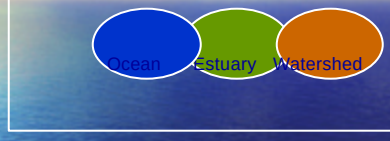
- Climate Change
- Land and Resource Use
- Invasive Species
- Pollution
- Extreme Natural Events

Drivers of Ecosystem Change



Why Are You Here?

- To generate a plan for research that ultimately will lead to a comprehensive understanding of the Great Bay Estuary, its living resources, its habitats (and the alterations that have impacted them), uses of surrounding lands and the effects of those uses, outside influences, etc. This improved understanding or integrated assessment will provide a strong scientific basis for future management decisions affecting the Great Bay.



Ecosystem Approach Means:

- Beginning with the end of integration and synthesis in mind
- Having all program elements coordinated and collaborating from the start – no one gets to do just "his or her thing"
- Ensuring that data are "mergeable" from the outset
- Placing all data in a central storage and retrieval system

Integration and Synthesis: Putting The Pieces Together

- Essential for ecosystem approach to management
- Require up-front planning and commitment
- Are the products that will drive management and policy

Science and Management: Directed Research

Sometimes the results are unexpected, leaving you with some interesting and challenging analysis and synthesis to do!

Output: Integrated Assessment of the Estuarine Ecosystem

- **Document status and trends of ecosystem and cultural resource conditions**
- **Relate those trends to their environmental and economic causes and consequences**
- **Identify major gaps in available information**

Output: Integrated Assessment of the Estuarine Ecosystem

- **Prepare plans to address identified gaps**
- **Construct models to predict outcomes of alternative management actions**
- **Evaluate effectiveness of various management decisions**

Paul A. Sandifer

Senior Scientist
NOAA's National Centers for Coastal Ocean Studies
c/o Hollings Marine Laboratory
Charleston, South Carolina

paul.sandifer@noaa.gov